# 2404ID37-ASSISTIVE AMBIENT INTELLIGENCE: ENHANCING AUTONOMY FOR INDIVIDUALS WITH EARLY-STAGE DEMENTIA THROUGH SMART MONITORING


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# Problem Statement

- A dementia diagnosis not only affects the patient but also their close friends/ family who become their carers.
- According to a survey conducted1, most carers voted that a product that allowed PLWD to preserve their independence would be the most helpful in benefitting the patient and easing the burden of the carer.
- PLWD struggle to maintain routines, often dealing with bouts of forgetfulness and confusion and need to be constantly reminded to even complete their everyday tasksThe experience of each person with dementia is different.
- Hence it is illogical to approach the problem with only one rigid solution.This is the primary problem with existing technological solutions which have failed to focus on the variety of forms in which the disease manifests.

# Objective

- Develop a personalized and adaptive solution for individuals living with dementia (PLWD) that preserves their independence while easing the burden on their caregivers.
- The project aims to address the unique and varied challenges faced by PLWD by creating a flexible technological tool that adapts to the individual needs and experiences of each patient, rather than relying on a one-size-fits-all approach.
- This solution will help maintain routines, reduce instances of forgetfulness and confusion, and improve the overall quality of life for both patients and caregivers.

# Idea Description

The project consists of a website and RFID-enabled hardware.

**Website Features:**

- ❖ Caregivers can access a separate website to manage patient routines.
- ❖ The website collects patient details and habits for personalized setup.
- ❖ Allows caregivers to monitor the patient's daily activities remotely.

**Hardware Features:**

- ❖ A wearable band with an RFID scanner detects task completion.
- ❖ RFID tags are placed in strategic locations in the home.
- ❖ Objective: Enhance patient independence, reduce caregiver burden, and tailor support to individual dementia cases.

# Innovation

- **Integration of Technology**: Combining a user-friendly website with RFID-enabled wearables offers an efficient way to track daily routines, boosting patient independence and caregiver support.

- **Focus on Independence**: The RFID technology automates routine tracking, empowering dementia patients to maintain independence and reducing their need for constant supervision.

- **Personalized Care:** Unlike one-size-fits-all solutions, this project tailors support to the unique needs and habits of each dementia patient, ensuring that care is more effective and relevant.

# Target audience/Market

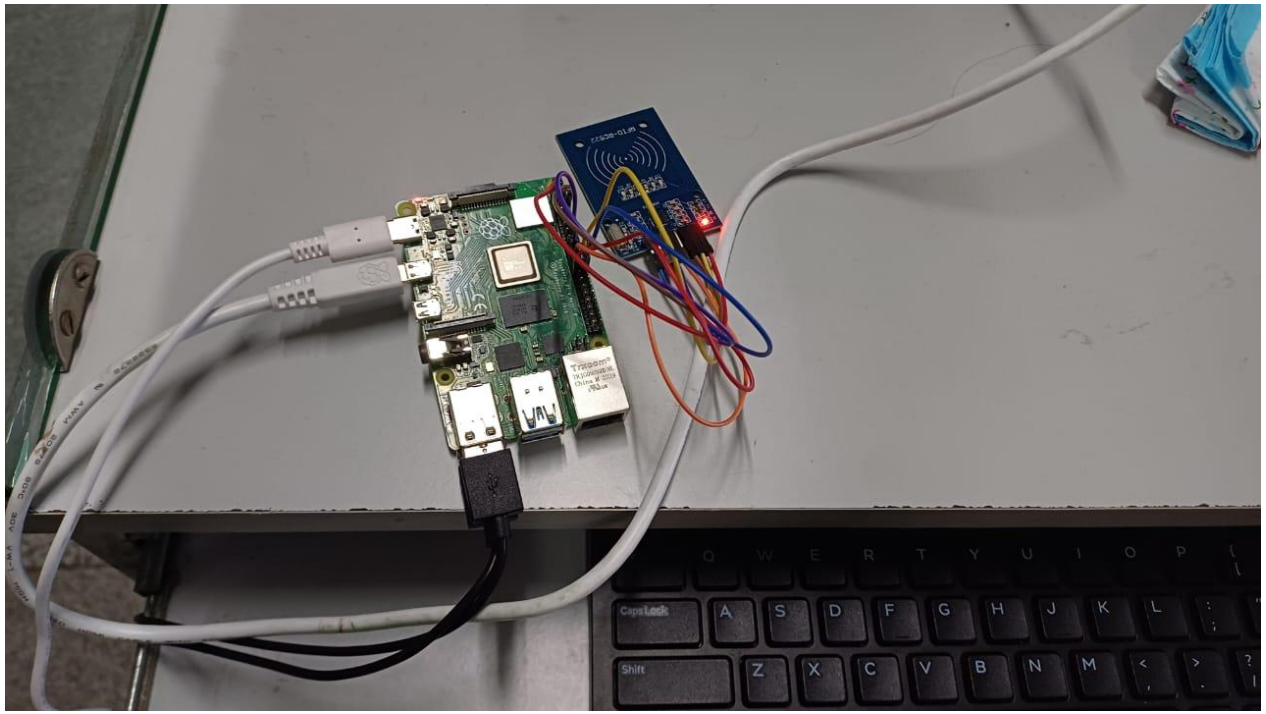
As mentioned earlier, the target audience for this project are the caretakers of persons with dementia.

This product has the potential to be popular among the target demographic as a specific device targeted towards people with dementia is yet to be introduced.

Many people with dementia and their families seek solutions that allow patients to live more independently, reducing the burden on caregivers.

**Data-Driven Insights:** Healthcare providers and caregivers benefit from the data collected by the system, which can be used to refine care strategies and improve patient outcomes.

# Proof of concept



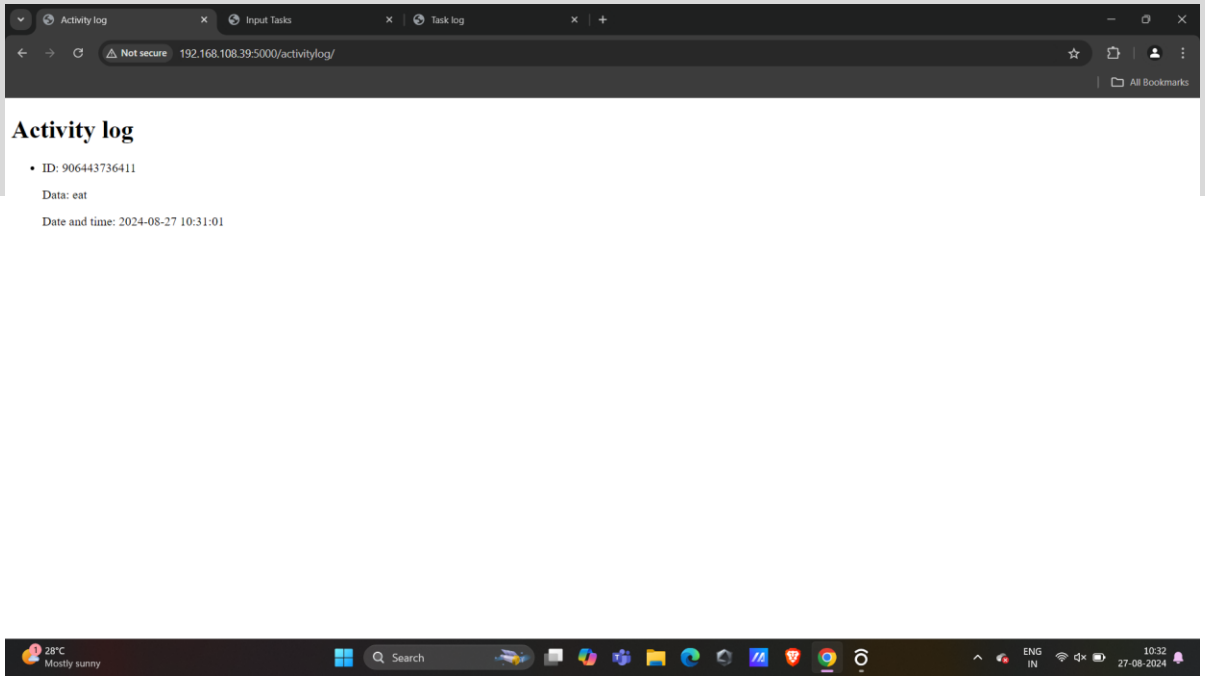
Prototype Hardware setup consisting of Raspberry pi 4B and RFID scanner

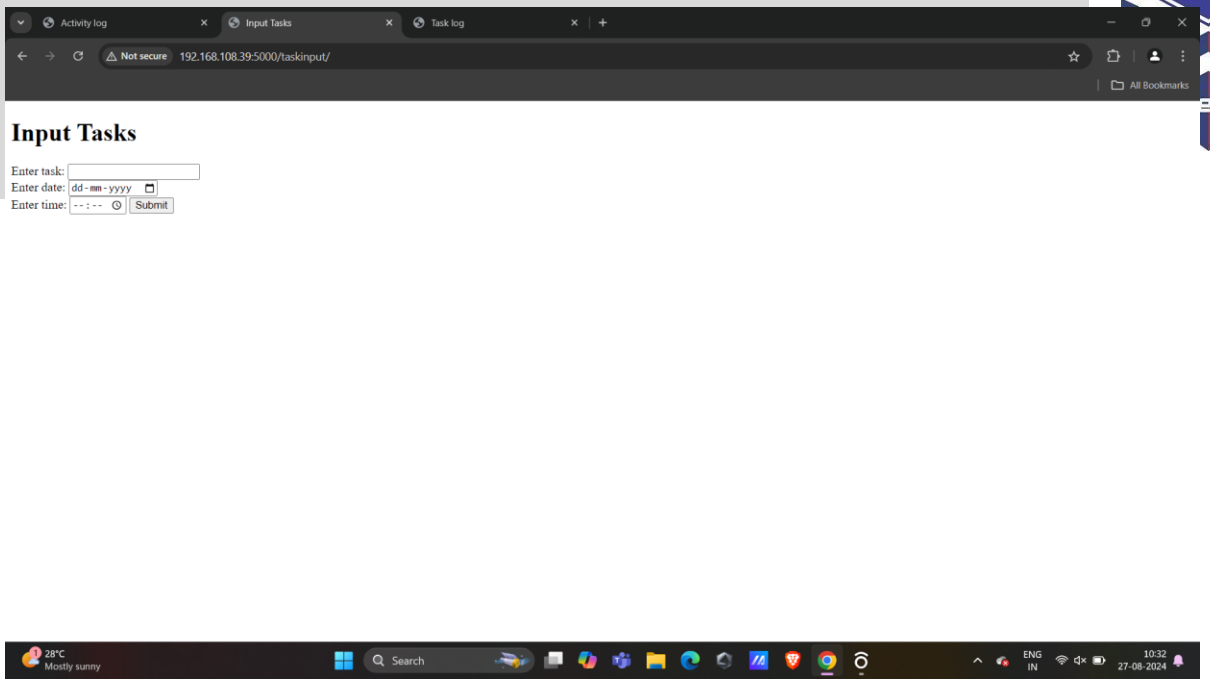
**Hardware used:**

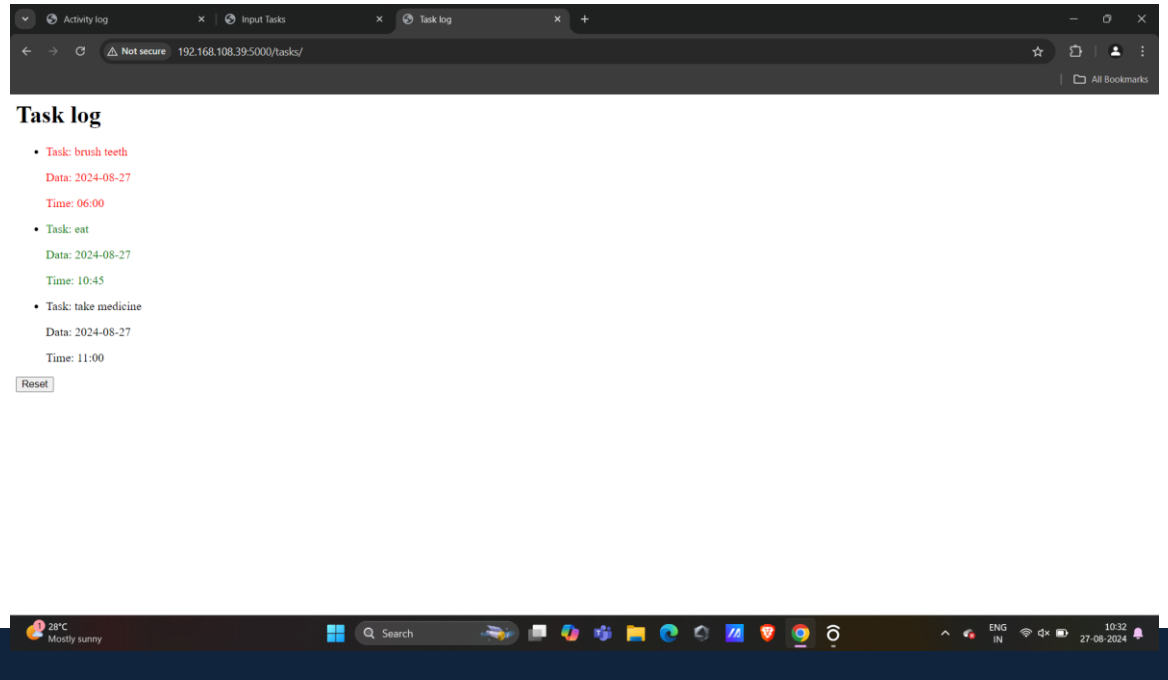
- Raspberry pi 4B
- RC522 RFID scanner
- RFID tags

**Framework used for webpage:**

- Flask



# Process and Key Challenges Faced

**Step 1:** Writing the RFID tags with the name of the task it is supposed to correspond to.

**Step 2:** Programming the Raspberry pi to read data using the RFID scanner

**Step 3:** Creating a set of webpages to display the activity log of the patient, take task list input from caregiver and display the tasks that have been completed/ left incomplete

It is difficult to make the prototype in the form of a wearable because as of now we are using widely available and easily programmable devices that are too bulky to be easily wearable.

# Technical Feasibility, Economic Viability and Scalability

It is possible to manufacture this device in a wearable form with the technology and miniaturization of sensors available today. The concept itself is fully realizable.

With the surge in popularity of health monitoring devices such as smart watches, smart rings and even smart clothing, the product is likely to be well received despite its price.

Since the device is a healthcare device that must have close to zero room for error, the actual realization of the product might be slightly costly and the product may not be affordable to all classes of society.

However, we strongly believe that there is a market for this product due to its unique target demographic.

# Social Benefits

The project significantly improves the quality of life for dementia patients by enhancing their independence and preserving their dignity.

This reduces the emotional and physical strain on caregivers, lowering their stress and workload.

Additionally, it provides personalized care and more effective patient monitoring, leading to better overall outcomes for both patients and caregivers.

Furthermore, it fosters a supportive community environment, encouraging social interactions and engagement, and helps in early identification and intervention of emerging issues, leading to more proactive care.

# Future Scope

With increasing rates of dementia, scope is increasing for such technology.

- The next obvious step to scale up the product would be to integrate the system with smart home devices such as smart TV, fridge, lighting, air conditioning, etc.

- This would enable the carer to further track and manage the activity of the patient.

- Integration with smart medicine dispensers which will allow the carer to accurately track medication intake.

- Development of AI that learns the patterns of patient and is able to converse with them in a more personalized manner